

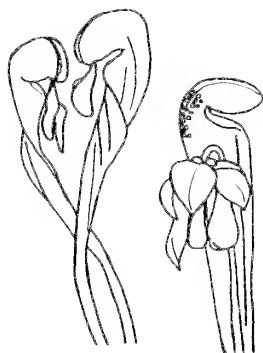
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CARNIVOROUS PLANT NEWSLETTER

VOLUME 16, Number 3

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CARNIVOROUS PLANT NEWSLETTER

Official Journal of the
International Carnivorous
Plant Society



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Front cover: *Drosera neocaledonica* in habitat on Mt. Dore, New Caledonia. Photo by Peter Jones and Mark Wilson taken on August 19, 1984.

The co-editors of CPN would like everyone to pay particular attention to the following policies regarding your dues to the ICPS.

All correspondence regarding dues, address changes and missing issues should be sent to ICPS c/o Fullerton Arboretum, CSUF, Fullerton, CA 92634. DO NOT SEND TO THE CO-EDITORS. Checks for subscriptions and reprints should be made payable to ICPS.

All material for publication, comments and general correspondence about your plants, field trips or special noteworthy events relating to CP should be directed to one of the co-editors. We are interested in all news related to carnivorous plants and rely on the membership to supply us with this information so that we can share it with others.

Views expressed in this publication are those of the authors, not necessarily the editorial staff.

Copy deadline for the March 1988 issue is December 1, 1987.

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EDITORIAL

READER SURVEY

Along with your copy of CPN in your envelope this time is a reader survey on a separate sheet. We would like you to complete it and send it to co-editor Don Schnell (Rt. 1, Box 145C, Pulaski, VA 24301, USA) within five days of receipt so that we will have time to hear from our overseas subscribers before tabulating the results.

We conducted one of these surveys several years ago and the results were very useful, both to us in seeing what you wanted in CPN, and we would hope for you also in seeing some new ideas and keeping the old that are most useful. Now with many new subscribers since, we are doing another survey. We would always hope for a 100% response, but that never happens in any mail-in survey. Still, the more of you who do respond, the more certain will be our concept of what we can do in the future.

The questions require written answers—please type or print clearly if your handwriting is not clear—but should not take too much time. Some questions will be non-applicable to you, in which case indicate or simply leave blank. Be as brief as clarity and the intent of your answer will allow in each case.

So, complete those surveys and send them in! We will tabulate the results and present a summary in a future issue.

DES

— SPECIAL NOTICE —

On Aug. 21, 1987, I received a letter dated Aug. 18, 1987 from Bruce MacBryde, Ph.D., Staff Botanist, US Fish and Wildlife Service which contained the following items of news:

1) At the sixth meeting of the Conference of the Parties of CITES in Ottawa in July, 1987, the remainder of the genus *Sarracenia* was placed in Appendix II, effective Oct. 22, 1987. Presumably, this also includes hybrids, and of course all species. This action restricts exchange or receipt of such material between citizens of CITES participant countries, according to appropriate permit regulations for both commercial and private shipping.

2) Due to FWS concerns about them, the *Sarracenia* identification sheets have **NOT** been incorporated in any inspectors' manual. (These were published in the June, 1987 issue of CPN).

DES

Don Schnell's book, **CARNIVOROUS PLANTS OF THE UNITED STATES AND CANADA** is now available at a new low price of \$9.50 per copy. You can order through your bookstore, or at a shipping cost of \$1.50 for one or two copies directly from the publisher (1-800-222-9796 outside of NC; applicable sales tax for NC addresses only). The publisher's address is John F. Flair Publisher, 1406 Plaza Dr. SW, Winston-Salem, NC 27103, USA. VISA or MasterCard accepted.

SPECIAL NOTE

Country Hills Greenhouse, which has been listed as a CP source for several years, is no longer in business. Instead, send inquiries about CP (or a catalog of all their exotic plants) to: **Glasshouse Works, Church St., Box 97, Stewart, OH 45778-0097**. Country Hills has actually been an outlet for Glasshouse which is now dealing direct. They have a good collection of *Nepenthes*. Please do not send any more correspondence to Country Hills.

NEWS AND VIEWS

DON KISIL (Dept. of Plant Science, 935 Campbell St., Winnipeg, Manitoba, Canada R3N 1C8)

I have recently initiated the setup of a carnivorous plant display at the University of Manitoba, where I currently attend. Unfortunately, I am doing all this on a volunteer basis as I am not being paid for my time or given funds for the purchase of plant material. Any donations of plant material or seeds would be greatly appreciated particularly from Canadian growers. Thank you.

ANDY LANIER (901 N. Greene Ave., Lakeworth, Fla. 33461)

I enjoyed the latest newsletter. I had a chance to explore in northwest Florida, southern Alabama and southern Mississippi about 2 months ago. I saw many nice CP but was also very disappointed to find many areas where plants used to be but are no more. Many other areas are scheduled for development also and I can see literally thousands of plants that will be destroyed.

Several months ago, there was pictured in CPN a \$20 bill from Malaysia that has a *Nepenthes* pictured on it. These are available for \$12.00 postpaid from:

International Stamp and Coin
P.O. Box 12016
50764 Kuala Lumpur, Malaysia

They will accept cash or a check made out to Mr. Steven Tan. The bill is very pretty and the *Nepenthes* is very clear. Also during the last few months New Caledonia and Palau have both issued postage stamps with *Nepenthes* on them. I would be glad to help anyone interested in getting these. The Palau stamp is a \$3.00 U.S. stamp and I'd have to have an order of 10 in order for my contact to get them as singles. They would probably cost \$4.00 as I deal with a commercial outlet. This stamp is in a large set and would cost at least \$15.00 if the entire set was purchased.

By the way, my carnivorous plant stamp collection was chosen by the American Topical Association as the most exotic and unusual topic in stamp collecting. I'm in the process of updating my checklist of stamps and will share it when finished.

JOE MAZRIMAS (CPN co-editor)

In a previous issue of CPN, I mentioned a new product which is a polymer of polyacrylamide gel that absorbs hundreds of times its weight in water and can hold nutrients for plant roots. I think this material ought to be tested with CP since its properties seem so ideal for releasing water and nutrients to the roots, improving soil structure and increasing air spaces. The dried gel granules absorb 200-400 times its weight in water and lasts 5-10 years in the soil. It is non-toxic and eventually breaks down to carbon dioxide, nitrogen and water. It takes about one ounce of crystals in 4 quarts of water to wet and expand into gel-like pieces. Dilute fertilizer solutions can be substituted. Generally, one mixes one part gel to 6 parts soil and it takes at least two weeks for the roots to attach themselves to the gel. Once the roots attach, you don't have to water so often even though the soil feels dry. You can allow them to go twice as long between waterings. A package of 5 blister packs that treats ten 6-inch pots costs about \$4.00 and is available in larger quantities at your local nursery. It is called Broadleaf P4 and if you can't find it locally, write to: Broadleaf Industries, 6150 Lusk Blvd., Suite B-103, San Diego, CA 92121.

ANGELA M. NICHOLS (118 Wausau St., Tazewell, VA 24651)

In the March CPN Jim Emerich writes requesting a way to acidify his water. I use city water with a pH of 7.2 which my plants do not like. I purchased a reverse-osmosis unit but sent it back because of very high water & sewer rates in my town. Then I tried catching rain water which is a real pain.

I discovered a product which might be worth mentioning to CPN subscribers. It is a water conditioner called Green-O-Matic manufactured in San Diego, CA. I ordered mine from Orchids by Hauserman, Inc. in Villa Park, Illinois for \$3.50 for a 4 oz. bottle.

Using 20 drops for a gallon of water the product advertises that it will "reduce toxic soluble salts, improve drainage & fertilizer utilization, increase water penetration and plant absorption, soften soils, and enhance plant appearance and growth rate."

It really seems to work for me! I have some bromeliads that have just sat in their pots for 8 months without much growth. There was a lot of accumulated salts & minerals around the top of the pots. Now these salt deposits are gone & the plants are growing rapidly & sending up offsets.

I also have some pings that were diminishing away to nothing that have now doubled their size since using Green-O-Matic.

The product contains sulphuric & phosphoric acid & care should be taken not to splash it into the eyes. It turns my pH 7.2 water to below pH 6.0. It goes off my color chart of my test kit. The color is quite yellow.

I hope this can be of help to some of your subscribers.

DAVID PILLARS Jr. (122 W. Nelson St., Hastings, MI 49058)

I recently visited a friend who had an unbelievable outside bog that was built in a depression in the ground about 30 feet long and 20 feet wide. In it was growing *S. oreophila*, *S. flava*, *S. leucophila* and *S. rubra jonesii*. He told me that most of them have been growing there all year for about 15 years. Their growth was supported by natural water seepage. He also had another bog in which he successfully grew *Darlingtonia* through the winter, but the plants died during the hot days of July. If properly done, some *Drosera* and *Dionaea* can survive the winter, but do not become strongly developed plants.

For those of us who do not have natural bog conditions, there is a simple method that also works. Place a child's wading pool in the ground. These pools are usually about 8 feet across and one foot deep. Then fill with a 50/50 mixture of sand and Canadian Peat Moss which is well moistened. The plants are positioned into place and a layer of 1-2 inches of live sphagnum moss sits on top. To keep the plants alive during the winter, they must be covered before it freezes an inch down which is about the end of November. This is done by trimming all the old pitchers away and thick plastic sheets are placed over the plants. Then cover with pine boughs and then more plastic. I place another wading pool the same size as the one below on top of all of the above. This must be done for several years until the plants are hardy enough to go unprotected.

JIM POWELL (2524 Denning Lane, Chesapeake, VA 23321)

I have found a bookbinder who does an excellent job at a reasonable price. I bound my CPN in volumes of three years each at a cost of \$10 and would cover a volume up to 3 inches thick. They do mail order work and I feel are worth knowing about by anyone who wishes to bind their journals.

Long's Bookbinders
2800 Monticello Ave.
Norfolk, VA 23504

RUSSELL A. REDLER (304 Jefferson Heights Ave., Jefferson, LA 70121)

I enclose a newspaper clipping dated July 4, 1987 which describes the creation of a large lake in Western Mississippi by damming two creeks. This lake of 170 acres will be the centerpiece to development of 6 homesites around the lake. The developer christened the body of water Lake *Sarracenia* because thousands of *Sarracenia* in the pine bogs were flooded to make this lake. There was no mention in the article about rescuing the plants and so they are presumed to be lost.

DON SCHNELL (Rt. 1, Box 145C, Pulaski, VA 24301) reports that an additional parcel of Green Swamp land in southeastern North Carolina has been donated by Federal Paper Company to the North Carolina branch of the Nature Conservancy. Readers may recall that the previous preserve donation in 1977 was 13,850 acres. The new donation is 1872 more acres, including the 92 acre Big Island Savanna. The Big Island Savanna is considered to be the largest and most ecologically important pine savanna remaining in the state. The flora is extremely diverse and samples have turned up as many as 40 plant species per square meter! The remainder of the large parcel is composed of smaller savannas and pocosins interlaced with streams. Since the North Carolina chapter of the Nature Conservancy was formed in 1977, 288,000 acres of valuable habitat have been preserved in North Carolina alone—Well done!

FAY B. WEINSTEIN, M.D. (P.O. Box 557, Hauula, Hawaii 96717) writes:

Dear Mr. Song: I have just read Dr. Fowley's article on 'Cultivation of Orchids - in Live Sphagnum Moss' in the Orchid Digest. I have recently succeeded in growing live moss by accident. I had a plastic bag loosely closed full of 'green moss' - a brown sphagnum-like moss used around here in horticulture. I have never seen it any color but brown and in bales. When I pulled out the plastic bag to see what was in it, it had bright green moss growing - not algae, but fluffy, leafy, pale green-growing moss. I hope to grow some more using a bed outdoors shaded and watered with rain or rain water. I am also trying just as of now some Canadian Sphagnum I bought in a bag for that purpose. The 'green moss' is not the same as Canadian sphagnum. I don't know its name, perhaps could find out. It is also entirely dissimilar to New Zealand moss which I also use. Please give any advice that occurs to you. I did read the article carefully. I want to grow *Nepenthes* and also to use live sphagnum for some orchids.

Leo Song, co-editor of CPN, replies to Fay: Take dry moss and moisten thoroughly. Squeeze out ½ of the water, then put in a clear plastic bag in diffuse light and wait. Viable spores will germinate and will grow into visible plants in a few months.

CURTIS YAX (233 Chestnut St., Oneonta, NY 13820)

Several years ago, I reported that the cutting of flower stalks might extend the lifetime of *D. burmanii*, green. The original plant died eight months into the experiment due to a sow bug infestation from plants received from West Germany. I had to remove the soil from two large terrariums and wash the roots clean of any clinging peat and moss. This treatment killed the sensitive *D. burmanii*. But the scraping of roots to rid it of soil seems to have stimulated many *Droseras* into suddenly producing new growths and within a few weeks, I had many new healthy plants. The species which benefited by all this were *D. aliciae*, *D. hamiltonii*, *D. villosa*, *D. natalensis*, *D. cuneifolia*, *D. adelae*, *D. regia* and *D. dielsiana*.

I continued the experiment with several new plants of *D. burmanii*. One plant died because I let the flower scape to grow to 1½ inches before cutting it off, so one ought to cut the scape after it reaches about ¼ inch high. If you cut sooner, the plant seems to exhaust itself by continually producing flowers. If you let the scape grow higher, the plant will die because it thinks it succeeded with its annual life cycle. I have extended the lifetime of several specimens to 7 months so far and I will let you know how much further they will grow.

Last year, a *Drosera* seed germinated in a cup of rainwater with a little peat moss on the bottom. The seedling grew fairly large without problems of damping off by fungi but there are problems with algae, so one must let it evaporate a bit and continually add fresh rain water. This could prove to be an interesting way of producing new plants.

This spring, I received some beautiful *Darlingtonia* plants from Chuck Powell as part of a trade. These new plants are doing fantastically and even better than some new *Sarracenias* that I'm growing! After reading instructions on growing them from Mr. Slack's and Dr. Schnell's books as well as following Mr. Powell's instructions, these plants are now well established and producing very large pitchers! I water them three times a day when its hot with refrigerated rainwater that is 45-50 degrees F. No less than 3 quarts are used with each watering for the 10 inch potted plants and one quart for the 6 inch potted plants. The plants

receive 2 hours of direct morning light coupled with misting. I reuse the same water by catching it in a 12 quart wastepaper basket seated underneath the pot. The pots sit on a plastic saucer that have holes burned into them with a red-hot screw driver. This works out well, for at the end of the day I empty the water back into the one quart jars and put them into the refrigerator overnight. By morning, the 12 quarts of rainwater are at the desired temperature of 45-50 degrees F.

I use an aquarium thermometer to measure the moss temperature inside the pot. The readings fluctuate between 50-55 degrees after flushing and then they gradually go back up to around 60-70 degrees about 4 hours later. These measurements are taken on a sunny day with air temperatures of 90-95 degrees. I feel that the *Darlingtonias* tolerate a much higher temperature at the roots than we realize. Mr. Powell only waters once a day even when his temperature of the day is 95 degrees and his plants are healthy and strong.

I like to thank all those who wrote to me about my *D. petiolaris* article and my concern for bog wildlife. A few additional notes on *D. petiolaris* follow. First, I noticed a movement of the leaf blade and tentacles when feeding small fruit flies or bits of tubiflex worms. Secondly, it's best to use distilled water and not mineral spring water for obvious reasons. Also, a clean razor blade is preferred over scissors to make cuts, since scissors tend to crush plant tissue causing rot to set in. The woolly sundew should not be disturbed too often with dividing but should be allowed to clump. Young plants with new growth crowns will produce normal leaves and traps but older plants seem to have less vigor and grow without traps until they are divided.

I have found that a garlic natural non-toxic spray works well on ridding *Sarracenias* of aphids. Crush one bulb of garlic (skin and everything), add two cups of rain or distilled water, boil for 15 minutes and allow it to stand for one hour and strain. If you don't use it all, then store it in the refrigerator. There is a garlic smell for only a few days but the only precaution is to avoid getting the spray into your eyes.

I'd like to conclude here by saying it's nice to read articles and letters from young people also.

Victorian *Nepenthes*, American Style

by Bruce Bednar,
P.O. Box 7026, Ocala, FL 32672

Thirty years before the turn of the century, growing *Nepenthes* became very popular among the well-to-do. Only the rich with large estates had stove houses and gardening staffs and could afford to dabble with orchids and other costly exotic plants. This upper echelon dealt with large established botanical gardens to obtain stock. At that time growing orchids was a status symbol, and growing *Nepenthes* put you above the orchid growers. Most *Nepenthes* growers were in Europe, however one stands out even today, as many of his hybrids are still very popular in collections.

James Taplin began his work with *Nepenthes* at Chatsworth in England, but had no success. He ended up moving to the United States, seeking a warmer climate. Taplin succeeded much beyond his expectations when working for George Such of South Amboy, New Jersey, and became the lone American *Nepenthes* hybridizer. It appears that Taplin made no less than five different hybrid crosses over a fifteen-year period which in those days was remarkable. The nucleus of the Such collection, which Taplin worked with, was five major plants that flowered for him: *N. mirabilis*, *N. gracilis*, *N. rafflesiana*, *N. x hookeriana*, and *N. x sedinii*. His three earliest crosses were late in the 1870's, *mirabilis x hookeriana*, *sedinii x hookeriana* and *gracilis x domini*. Clones were chosen from the offspring and named; some were very similar. Seed germination must have been poor with the *gracilis x*

domini cross as only one clone ever got labeled, *x courtii*, now extinct. Taplin himself kept no manuscript or records and did not write for publication at all. With the majority of Taplin's hybrids, the descriptions included in written material were all done by Veitch. Importantly, Veitch indicated that the plant known as *N. x domini* (*N.sp. x rafflesiana*) was thought to be a *gracilis x rafflesiana* hybrid by most. But Veitch personally knowing what was in cultivation, and whose collection it was in, theorized that *x domini* was instead a *hirsuta x rafflesiana* to which I totally agree, making Taplin's *x courtii* a *gracilis x (hirsuta x rafflesiana)*. Much material was sent to Europe. B.S. Williams ended up with the majority of Taplin's hybrids, as they were considered superior to European forms. Williams relabeled some material in London and distributed them, so some 20 or so clones were named from each of the *x hookeriana* crosses, hence the problem of look-a-likes!

In the early 1880's one more cross was made between *N. rafflesiana* and *N. x hookeriana*. Again, many clones were named and distributed overseas; however, not one is accountable for today. Taplin's last triumph was a simple species cross made in the mid-1890's of *N. mirabilis x N. rafflesiana* (= *N. x hookerae*). Oddly enough, no other clones were named. Taplin did have a daughter named Emily, and two of his closest friends were Court and Outram, both of whom were honored with hybrids named after them. Unfortunately, with the turn of the century, *Nepenthes*' popularity died out.

The following is a list of Taplin's victorian hybrids that are still with us. Over two dozen other clones were named, and are believed to be extinct. From his *N. mirabilis x N. x hookeriana*; *coccinea*, *morganiana*, *atro-sanguinea*, *paradisae*, *robusta*, *wrigleyana*, and *dormanniana*. Of the *N. x sedinii x N. x hookeriana*; *williamsii*, *superba*, *outramiana*, and *henryana*.

A final note, since it has been over a century for most of Taplin's hybrids, there is no absolute way for positive identification, even though most of the surviving hybrids fit the original descriptions and/or line drawings. This for many is not enough to substantiate proper classification. Many other victorian hybrids are still available, however the major percentage of surviving hybrids are from James Taplin—may his name never be forgotten.

SOME OF TAPLIN'S EXTANT VICTORIAN HYBRIDS

Upper right — counterclockwise *N. X: paradisae*, *williamsii*, *coccinea*, *dormanniana*, *atrosanguinea*, *hookerae*, *wrigleyana*, *outramiana* (small pitcher bottom) and *superba*.

Photo by author.



NAMING THE HYBRIDS

by Bruce Lee Bednar, 12731 SW 14th Street, Miami, Fla.

When it comes to properly identifying plants, many persons back away. The same problem occurs with the naming of *Nepenthes* hybrids. Many new *Nepenthes* hybrids are going unnamed due to the complexity of the rules established by the International Code of Botanical Nomenclature. Appendix I alone devotes five pages to the naming of hybrids, and the code sets rules in tedious detail in several hundred pages. When I talked with four different orchid growers who have crossed hybrids and named them, few knew more than me about the rules. The rules are international, yet are not used internationally; few persons know the laws and even fewer seem to practice them in the *Nepenthes* field. One now would think to consult with the Code book, but you would need a professional botanical taxonomist at your side as "the code is complex in areas and requires a kind of botanical lawyer," quotes Don Schnell.

About 140 years ago in Europe when Dominy made the first *Nepenthes* hybrid, he used the rules governing the naming of orchids at that time. Seedlings (called siblings) are named as a hybrid group, eg. *N. x dominii*. Later as plants matured, specific clones were labeled as varieties. Shortly after this time other *Nepenthes* nurseries made crosses such as *N. mirabilis* x *N. hookeriana*. Instead of naming the whole group they let the plants mature awhile, then gave hybrid variety names to them, then supposedly destroyed the other common, unnamed siblings, (as the Missouri Botanical Gardens did with the Pring cultivars.)

Today's rules and laws for hybrids go something like this: When two plants get crossed and registered, (different Genus, species or hybrids makes no difference) then T X C seedlings are all TC, always and forever. Now after they mature, you can pick out unusual clones and label them separately as varieties, such as TC var. A, B, C etc., usually with non-Latin names (example *N. x "Lt. Pring"*). A variety can only be reproduced by division. If you self-pollinate a variety (common in orchids) all its seeds are once again back to TC. Since the *Nepenthes* genus is dioecious (separate staminate and pistillate plants), this is, of course, impossible. If 200 years later you cross T x C or C x T you still get TC. New varieties can be added on later as more siblings mature and prove to be unusual.

These rules don't always seem to fit *Nepenthes* for some reason as T x C and C x T are not always the same. Reverse crosses in the past have been given different hybrid names, and when crossing an identical hybrid back to itself as in *oisoensis* x *oioensis* one somehow comes out with a new hybrid, *N. x koiisoensis*!

See: NAMING . . . Page 70

OLD CLONE, NEW HYBRID

by Bruce Lee Bednar, 12731 SW 14th Street, Miami, Fla.

Today, in cultivation, an unusual female *Nepenthes* clone is going by the name of *N. curtisii* as well as *N. spectabilis* (not to be confused with the true Sumatran species). Where did it come from? What do we really know about it? Well, in 1883-84, on Curtis' second mission to Malaysia, he collected and sent home two species previously unknown. One was named after himself, *Nepenthes curtisii*, the other which was similar and supposed to be a variety of *N. curtisii* was later given specific rank as a species by Dr. Masters who described it to be *N. stenophylla*. Later, Danser wrote that *N. curtisii* was simply a form of *N. maxima*, to which I do not agree at all. Almost everyone then, as well as today, fail to notice, both in upper and lower pitchers, when they first open, a clear, well-defined, solid white band that encircles the peristome. As the peristome matures it folds down over the white band,

See: OLD/NEW . . . Page 70

The rules are constantly being pushed aside and ignored. In 1895, Taplin crossed *N. rafflesiana* with *N. mirabilis* and named it *N. x hookereae*. This hybrid name (even if the plant goes extinct) according to the rules must be used for ALL similar crosses, yet a recent Japanese cross of reverse parentage (*N. mirabilis* x *N. rafflesiana*) bears the hybrid name of *N. x nagamogo*! Other identical crosses have yet different names as *N. x rokko*, *N. x balmy koto*, and *N. x masamiae* are all *N. maxima* crosses. Many new hybrids are remakes or reverses of old Victorian crosses.

Keep in mind that when writing down the equation for describing a hybrid, the pistillate (female) plant comes first followed by the staminate (male) plant. Hence in (*mirabilis* x *hookeriana*) the *mirabilis* is the female and the *hookeriana* the male.

The rules do manage to stay true to the named natural hybrid complexes which are capable of backcrossing and stabilizing populations long after parent plants have disappeared, (*hookeriana*, *trichocarpa*, *harryana*, *merrillata*, *trusmadiensis* and *kinabaluensis*). Many natural hybrid complexes are given horticultural designations regardless of backcrossing or variation.

References

H.J. Veitch, Journal of the Royal Horticultural Society, Sept. 1897.

L.H. Bailey, Standard Cyclopedia of Horticulture, 1922.

J. Marabini, CPN 13 (2).

S. Kurata, *Nepenthes* of Mount Kinabalu, 1976.

T. Kusakabe, CPN 12 (2): 31 and CPN 8 (1): 14.

D. Schnell, letter to/from Oct. 1985

Interviews with four orchid breeders in Florida, June-Dec. 1985.

OLD/NEW . . . continued from page 69

completely hiding it. This, as well as the fine hairy texture to the leaves, seem to indicate that the plant is a natural hybrid between *N. maxima* and *N. albo-marginata*. No plants resembling this clone have ever again been found, indicating it was scarce then. Perhaps it was one of a few hybrids maintaining a small population now extinct. Since *N. albo-marginata* and *N. maxima* rarely share the same local, this natural hybrid has not been found again and a good example of this situation is *N. x cincta*. *Nepenthes x cincta* was a natural hybrid between *N. northiana* and *N. albo-marginata* found only once, and now extinct from cultivation.

To make things worse, Witte, Curator of Leiden Gardens, crossed in 1897 the two plants that Curtis had sent back. By then the two plants were considered *N. maxima* (*curtisii*) and *N. stenophylla*. The cross gave rise to the hybrid *N. x wittei*. *Nepenthes x wittei* has the pitchers of *N. curtisii*, including the white band hidden by the large peristome, and the brittle foliage of our familiar *Nepenthes stenophylla*. All things taken into account, I believe our mystery plant of *N. curtisii*, *N. spectabilis*, *N. maxima* 'Superba' really to be the natural hybrid *N. x curtisii* (*N. maxima* x *N. albo-marginata*) and *N. x wittei* is *N. x curtisii* x *N. stenophylla*.

References:

Gardeners Chronicle XXI 1884, 540.

Gardeners Chronicle VIII 1890, 240.

Veitch, Journal of the Royal Horticultural Society, 1897, 237.

Danser, *Nepentheaceae* of the Netherland Indies 1908.

A Preliminary Report on *Drosera intermedia* X *D. capillaris*

by Philip Sheridan
(Rt. 2, Box 310H, Woodford, VA 22580)

While botanizing Pender County, North Carolina in November 1984, Jim Darlack and I discovered a colony of robust *Drosera* with prominent winter hibernacula.* These unusual *Drosera* were interspersed between colonies of *D. intermedia* and *D. capillaris* in a sand seep off route 17. Some individuals were more than sixty-two millimeters in diameter, larger than many *D. intermedia* or *D. capillaris* in the vicinity. Additional noteworthy characteristics of the *Drosera* were wide glabrous petioles with a blade intermediate between *D. intermedia* and *D. capillaris*. The hibernaculum was similar to a winter bud of *D. intermedia* and measured six to seven millimeters in diameter. The growth habit was a prostrate rosette. Several specimens of this unusual *Drosera* were collected and brought into the Sheridan and Darlack collections for further study. The Darlack plants were grown through the winter of 1984 producing small white flowers.

Upon learning of the discovery of this unusual *Drosera*, Dave Butler and Bill Scholl expressed an interest in seeing the plant in its native habitat. Mr. Butler has been studying *Drosera* hybridization and the possibility of a new hybrid was something to be investigated. On May 12, 1985 the sand seep was revisited and a note was made of some of the interesting flora and habitat. The bog was observed to slope eastward from route 17 into an area cleared and fenced by a landowner. The unusual *Drosera* were growing in a site moderately pastured by horses. Shrubs were few, small and widely scattered. *Sarracenia flava*, *S. rubra*, *D. intermedia*, *Utricularia cornuta* and *Lycopodium* sp. occupied the wet depressions while *D. capillaris*, *D. brevifolia*, *Pinguicula caerulea*, *Dionaea muscipula* and *Polygala lutea* preferred the moist areas and pastured hummocks. Several species could be found throughout the bog in both wet and moist areas. The unusual *Drosera* were found in the areas where water oozed over the exposed white sand and peat. Adventitious plantlets were noted on at least one unusual *Drosers* and have previously been reported on other *Drosera* hybrids. (Wood, 1955; Butler, 1985). The growth habit of the unusual *Drosera* was noticed to be quite different from what had been seen in the fall of 1984. The plants now displayed an upright rosette yet lacked the characteristic long stem of *D. intermedia*. Several specimens of the unusual *Drosera* were collected by Butler and Scholl at this site. An additional colony of unusual *Drosera* was located later in the day off route 130 in Brunswick County. Collections were made from this site and specimens eventually given to John Hummer and Larry Mellichamp.

Variability in *Drosera* hybrids is not unknown. Kutt, Schnell and Sivertsen (1974) have noted that the punative hybrid *D. intermedia* X *D. filiformis* in the New Jersey Pine Barrens is somewhat variable. Wood states that the hybrid *D. linearis* X *D. rotundifolia* is "morphologically intermediate between the two species, but in a few characteristics resemble one or the other species more strongly."¹ In the case of the unusual *Drosera* the petiole is reminiscent of *D. capillaris* while the blade is intermediate between *D. intermedia* and *D. capillaris*. The summer growth habit of an upright rosette mimics *D. intermedia* yet the short stem shows traits of *D. capillaris*. The prostrate rosette in fall reflects *D. capillaris* with the winter hibernaculum being a characteristic of *D. intermedia*.

These unusual *Drosera* have now been grown for several years by Butler, Darlack, Hummer, Scholl and Sheridan. After discussion by all, it is agreed that this unusual plant is an unreported *Drosera* hybrid, *D. intermedia* X *D. capillaris*. The characteristics of hibernaculum, wide glabrous petioles, intermediate blades, growth habit and small white flowers all suggest that hybridization has indeed occurred between *D. intermedia* and *D. capillaris* in coastal North Carolina. The only other possibilities to explain these unusual

Drosera would be a new species, growth form or another *Drosera* hybrid. The large number of *D. intermedia* and *D. capillaris* all growing normally in the same habitat is not suggestive of a growth form. *Drosera* species were found growing in habitats ranging from full sun to partial shade. Although etiolation does take place in the shade, species are easily recognized. Moreover, the hybrids were growing in full sun which would rule out etiolation as a factor. The small number of specimens and intermediate characteristics would argue against a new species. The only other sundews in North Carolina that could be regarded as possible parents are *D. brevifolia*, *D. rotundifolia* and *D. filiformis*. Aside from the morphologic differences and the absence of two of these sundews from the bog, examination of the flowers of the *Drosera* hybrid disclosed features possessed by only *D. intermedia* and *D. capillaris*. Wynne states the seeds of sundews "are beautifully distinct and offer a great aid in identification ... by means of stipules and seeds the species of *Drosera* in eastern North America are easily separated."² Therefore intermediate seeds would mean a hybrid between *D. intermedia* and *D. capillaris*.

In the fall of 1986 a fruiting specimen of the sundew hybrid was brought to me by Bill Scholl for analysis. These plants were taken to the George Mason University Herbarium where the curator, Dr. Ted Bradley, kindly allowed me to use the dissecting and compound microscope. My friend Mark Strong assisted in the examination. The scape measured 10cm tall with six flowers. The inflorescence was noted to emerge horizontally before curving upward as in *D. intermedia*. The capsules measured 4-5mm and surpassed the calyx like *D. capillaris*. Seeds were brown as in both parent species with the oblong shape of *D. intermedia* and the corrugated ridges of *D. capillaris*. The seeds measured .3-.4mm long with undeveloped papillae. I believe the small size and withered nature of the seeds reflects their possible sterility. Whether the seeds are actually sterile or not will be reported at a future date along with a more detailed study of the sundew hybrid.

When the data provided by flowers and seeds is added to the intermediate characteristics of the leaves, I believe the case for *D. intermedia* X *D. capillaris* is quite convincing. Additional taxonomic and cytologic work is still needed on this hybrid sundew and I would welcome requests for specimens for serious scientific study.

Acknowledgements

I would like to thank Dave Butler for his comments and suggestions and Brian Kahn for obtaining copies of the Wood and Wynne articles.

Footnotes:

1. Carroll E. Wood: Evidence for the hybrid origin of *Drosera anglica*. *Rhodora*, 57; 110 (1955).
2. Francis E. Wynne: *Drosera* in eastern North America, *Bull. Torrey Bot. Club*, 71; 170 (1944).

*The first specimen was noticed by Mr. Darlack

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Drosera intermedia* x *D. capillaris



Pender Co. - May 1985

Note the upright rosette, wide glabrous petioles and intermediate nature of the *Drosera* hybrid. *D. intermedia* is to the left for comparison.



Pender Co. - Nov. 1984

The *Drosera* hybrid now displays a prostrate rosette with the winter hibernacula almost completely formed. The leaves of this specimen are green compared to the dull dark red of the May plant.

A FIELD TRIP TO NEW CALEDONIA

by Peter Jones and Mark Wilson

In August 1984, Mark Wilson and myself visited New Caledonia and collected several species of carnivorous plants. It was a trip that we had been discussing for about a year, but we had never quite managed to find time to go. However with the news in May 1984 that the Kanak population had given the French until 1985 to declare the island an independent nation "Or Else," we decided that we had better get over there soon, before any trouble started. It would have been a great pity to miss the opportunity to go there, as it is only 2.5 hours by air from Sydney, and has some unique carnivorous flora. The two months before our departure were spent researching the plants' habitats and locations, planning the logistics, and making contact with the relevant government authorities to arrange collection permits. I cannot overstress the importance of this point, as it is definitely not legal to remove plants from their habitat without written approval.

We arrived at La Tautouta airport on the evening of the seventeenth of August, after a leisurely flight aboard an Air France DC 10, where we spent the time chatting and drinking French wine. Upon arrival we were driven to the Isle de France hotel for a good night's rest.

We awoke to a beautiful Saturday morning, the view from the hotel which overlooked the Anse Varta beach was magnificent. After a quick shower and breakfast, we decided to pick up our rental car so that we could look for plants as soon as possible. Our cab driver deposited us in front of the Hertz office, and their efficient staff soon had us equipped with a Fiat hatchback. With maps in hand we drove off to look at the nearest *N. viellardii* site. We arrived, only to find that suburban Noumea had grown quite a bit since the plant was recorded here in 1906. Although the mountains were still here, houses surrounded their bases and we could find no access to climb. Driving down the Noumea to Yate Road at Magenta we stopped at the base of a hill, and decided that it looked like *Nepenthes* should grow there, however we found nothing of any real interest amongst the dry forest which covered its steeply sloping rocky southern side. After an hour of fruitless searching, we reached the top and were rewarded by a wonderful view of the sea. Mark took the opportunity to collect some *Mimosa pudica* seed while I examined one of the many large land snail shells which were found in this area. We were disappointed by our lack of success, and after descending we decided to drive to Mt. Koghi which was a well-known site and had a sealed road to the summit.

After a thirty minute drive North West we reached the base of the mountain and as we drove up its southern slope, both of us noticed that the forest was far more lush here, it obviously received more rainfall than the previous site. We drove slowly up the narrow winding road with our eyes glued to the road verges, several times we stopped to look at plants whose leaves looked like those of *Nepenthes*, however each time was a false alarm. Finally we drove up a tight right hand turn and emerged from the forest zone, into an area of low shrub which was bathed in bright sunshine. We pulled off the road onto a dirt area which was obviously meant for parking. Mark and I got out of the car, and started for *N. viellardii* on the roadside verges, after a few minutes of unsuccessful searching, Mark shouted "I've found one," I rushed over and he pointed to a small rosette, which was almost completely hidden under some ferns.

It had only a couple of pitchers and they had seen better days, but we had found the plant that we had come so far to see. It was marvellous to look at this hardy little plant in its natural environment for the first time.

Climbing the embankment we found another, and then several close together amongst the shrubs and grasses. The more we looked the more we found, there were dozens. Most of them were fairly small, being rosettes between 100mm and 300mm in diameter, with thick succulent leaves. All of the plants here obviously grew in hard conditions, few exhibited the straggling green vines with long spaces between the leaves which are so typical of most

Nepenthes. Where the plants did produce stems most were devoid of leaves except at the growth tip, where they formed a rosette of closely spaced leaves, much in the manner of juvenile *N. albomarginata*. Here and there a plant had gone into vine, and climbed through a tree, when this occurred we found it easiest to spot, by looking for a mass of black vines, winding through the canopy of the tree, rather than by looking for pitchers. The tendency of the plants to have such a short growth tips, made taking cuttings very difficult indeed. Some *N. viellardii* at this site strongly resembled the plants that Dubard described as var. *Deplanchii*. Although most of the plants here had all green pitchers, some did produce beautiful scarlet lower pitchers. We were fortunate to find a few old seed pods from the previous November or December that had retained their seeds. Surprisingly these and all other *Nepenthes* seeds collected on the trip germinated rapidly. One thing that puzzled us was that although the plants here obviously produced millions of seeds each season, we were only able to find half a dozen seedlings in this whole area. Already one plant was beginning to flower for the coming season, it was a lone stem 300mm long that grew in a dry arid spot on its own, surrounded by the long dead stems of previous years.

After taking all the photos that we needed, Mark and I continued on up the road, which is lined with *Nepenthes* from 500m to 1070m. On the summit of Mt. Koghi stand a number of wooden tourist chalets, if you wish to stay the night. The temperature was about 25°C and humidity about 60% - 70% that day. The plants obviously preferred open scrubby areas to the shade of the forest, we saw only two plants in the forest and hundreds in the open. The delineation between these two vegetation types is easily visible from a distance. The soil is a red ultrabasic loam, which has a high mineral content, little organic matter, and an acid pH. Mt. Koghi receives more rainfall than most of the other mountains further south because it lies across a valley from the Humbolt ranges, which are the highest on the Island (1350m here and 1619m further north). They form a rain shadow, and Mt. Koghi receives the rain that is trapped by them. During our last three days in Noumea the Humbolts were covered by heavy cloud which never moved any further south.

NOUMEA 22 16'S.			166 27'E 30ft.		NEW CALEDONIA	
Period 1860-1914 Bibliography 24, 27	Average daily °C Max. Min/.		Temp. absolute °C Max. Min.		Relative humidity Average of observations at 0900 1500	Precipitation Average monthly fall mm
January	30	22	36	18	72 70	92.5
February	29.5	23	37	18	75 72	127.5
March	29.5	22	35	17	76 73	142.5
April	28.5	21	35.5	16	77 74	130
May	26	19	33	14.5	75 71	110
June	25	18	31	13	76 70	92.5
July	24.5	16.5	30	11	76 69	90
August	24.5	16	29	12	72 68	65
September	25.5	17	32	13	70 67	62.5
October	26.5	18.5	34.5	15.5	68 66	50
November	28.5	20	34.5	15.5	69 67	60
December	30	21	36.5	17	70 68	65



Habitat of *N. viellardii* on Mt. Koghi at 600 m. altitude, south west face. All photos by Peter Jones & Mark Willson.



N. viellardii from Mount Koghi. Upper pitcher at 600 m. altitude, south west face.



N. viellardii from Mount Dore. Upper pitcher at 405 m. altitude, north face.



Habitat of *N. viellardii* on Mt. Dore at 400 m. altitude, north face.



***N. viellardii* from Mount Dore. Lower pitcher at 420 m. altitude, north face.**

Sunday morning was warm and balmy, we decided to drive across the island to Yate which is on the east coast. About 20 km from Noumea we first saw Mt. Dore, it is an impressive mountain, even though it is only 772m high. As we drove past its northern slope we decided to stop and have a look. This mountain was much drier than Mt. Koghi, its lower slopes were covered with small trees and dense scrub. A small stream ran down the slope, so we followed it until at 300m alt. it disappeared underground. The soil was dry, red ultrabasic loam. It became a standing joke with us that the travel brochures spoke of a tropic isle, and we were climbing a mountain that compared favorably with some of the more arid parts of Australia. The plant species here were quite clearly related to our own flora, which gave the place a look of familiarity. At 300m alt. the trees gave way to the low shrubs and bushes, at this point the ground sloped steeply upward and our progress was hampered somewhat by loose soil. The slope became more easily traversable, once we reached the 400m level and climbed onto an old unusable dirt road.

We began to follow the old road in a westerly direction, then Mark said "Is that one up there" and pointed to a small sloping gully in the red soil. Scrambling up to the plants we saw that the upper pitchers were green with black peristomes and the lowers were all scarlet or purple. There was not much fluid in the pitchers and it was extremely viscous, very little prey was found inside. Moving on in the same direction, we found many small gullies, most contained *N. viellardii*. All had superb dark purple lower pitchers, but the upper pitchers were plain green. With no surrounding vegetation to support them, they ran downhill on the bottom of the gullies, often for some distance. Some of the old black woody stems were in excess of 40mm thick. As on Mt. Koghi the amount of seed released in this area each year, must have been enormous but we were unable to find even one rosette, let alone a seedling. It was now obvious to both of us, that the plants grew only in gullies on this mountain and that is where we concentrated our search. While continuing to climb in a westerly direction we found the gullies becoming larger and the *Nepenthes* fewer, the soil had changed too. As we gained altitude it now had a blackish red concrete hard crust over the softer soil. Some of the steep slopes were covered with a layer of dark red rounded nodules, negotiating these was like walking on ball bearings.

We were now on the western ridge of the mountain's north face at about 550m alt. It had been some time since our last *Nepenthes* sighting, so we travelled back toward the east ridge and finally crossed over it into a large re-entrant which faced north east. Immediately we did so spikey greyish grasses became abundant, moving down the slope, we saw our path was intersected by a gully about 2m deep. As Mark was climbing down the gully he spotted *Drosera neo-caledonica* growing amongst the grass clumps. Dozens of them were everywhere nestling at the base of the clumps, their stems were up to 75mm long and clothed with the dead leaves of the previous seasons. The colour of the dry stems matched the colour of the grass, no wonder we had walked by without seeing them. In appearance the plants resembled one of the larger pygmy sundews from Western Australia rather than *D. petiolaris* which is its closest relative. The soil here had a distinct feel of dampness about it. Across the other side the gully joined another which was much broader. Following this uphill for a short distance we spotted a small shrub in the middle of the gully covered with *N. viellardii*, whose pitchers had large holes eaten in them. Upon examination we found that many were inhabited by mosquito larvae. We were lucky enough to be able to collect seed from some of the many old pods left from the previous summer. *D. neo-caledonia* was also quite common here, some of which were just beginning to put up flowering scapes. As it was getting late in the afternoon, we reversed our course, headed downhill and crossed to the far side of an enormous gully, which ran down towards the base of the east ridge. It was some time before we could find a place to scramble down into it, here we found the only small rosettes that we were to see on Mt. Dore, they were growing about 2m up on the vertical gully wall. Two hundred meters further down Mark discovered the most impressive *N. viellardii* we had seen to date, it was growing in a rocky section of the gully which narrowed to about 1m, the plant was a 200mm wide rosette with a long green vine, the pitcher resembled a *N. khasiana* upper

but it was scarlet. Mark and I climbed out of this large creekbed, and then ascended the near vertical slope of the east ridge. We moved onto the north face at about 400m alt. and then descended diagonally across the face. We intercepted the western ridge at about 100m alt. where we found a small waterfall, the trees and shrubs grew thickly here, and in a tree at the base of the falls grew the last *Nepenthes* that we saw on Mt. Dore. The plant had all green lowers, and green uppers with black peristomes. The root system of the *N. viellardii* that we collected was unlike that of any *Nepenthes* we had seen before. The plants were equipped with a thick single taproot, which ended in a short tassle of black fibrous rootlets. The rosettes we found were only 150mm across, but they had taproots 320mm long. This made careful excavation essential when removing plants from the soil.

On Monday we spent half the day visiting the herbarium at O.R.S.T.M., the director Monsieur Moreau was extremely helpful and suggested locations for us to try, he also finalized our paperwork. The rest of the day was spent sightseeing. We spotted an aircraft wreck on the right-hand side of the Noumea to Yate Road the previous day, and had decided to have a closer look. It turned out to be a Hawker Heron and was not in too bad a condition, the engines and anything else of value had been removed though.

On Tuesday we resolved that we would drive to Yate, we had meant to go there on Sunday, but had climbed Mt. Dore instead. We stopped a few times to collect *N. viellardii*, in the hills between Mt. Dore and Mt. Col. de Mourange, however east of this point no more *Nepenthes* were found. Past Mt. Dore we drove through mountains which were covered with dry scrub and low trees, the only forest to be seen was always located on the southern slopes of these mountains, and even then, only in large shaded re-entrants. About 9km from Mt. Col. de Mourange the car passed a steep hill with an enormous gully eroded through its higher slopes. The soil was dry ultrabasic. It looked like a likely spot, so we stopped the car and followed a trail up its northern slope. About 300m from the road we found *D. neo-caledonica* growing, near a large electricity pylon, among grass clumps. One was in flower, it was the first we saw on the trip. Retracing our steps we continued on our way. As we drove past the shores of the lake at Marai Kiki Mark spotted some black vines covering a small roadside shrub, so we stopped to look around. There were *Nepenthes* everywhere, scrambling through the bushes about 100m from the edge of the lake. These plants had vastly different pitchers from the others we had seen, they were squat and barrel shaped. In fact they were very similar to plants illustrated in Dansers monograph¹. Our site at the lake was about 100m alt. Most of the pitchers were all green but some did have coral pink or black peristomes. Once again we found evidence of massive seed production but no seedlings could be seen. Closer to the lake the red soil was covered with blackish stones and gravel, amongst this, in full sun grew clumps of *D. neo-caledonica* the gravel surrounding these plants was hot enough to be uncomfortable as we took our photographs. The *Droseras* were about 50mm across and grew on long stems covered with dead leaves. None were flowering but many had started to put up scapes. A search of this side of the road revealed nothing new, so we drove off towards Yate. A few kilometers from the lake, the road climbed into the mountains once more. About 14km from the lake the road entered a plateau, where we found a pond. This had *D. neo-caledonica* growing around its edge, in the wettest conditions imaginable, some were completely submerged, many were flowering, these were the biggest *Droseras* we found. They measured up to 80mm across with flowering scapes as high as 250mm. The flowers were white and up to 25mm across. Soil was ultrabasic mud with decayed clumps of reeds forming hummocks of peat. Under the water at the edge of the pond grew *U. uliginosa*, some of the leaves were 40mm long few flowers were present, but as the leaves formed an extensive mat above the mud, the plants were easily seen. We continued on to Yate but from this point no more carnivorous plants were seen.

We decided to spend Wednesday exploring the hills around the man made lake at Marai Kiki *Nepenthes* scrambled through the roadside shrubs, but as we walked toward the hills the soil developed a very hard crust. Here and there rivulets had carved small crevices into the soil during the wetter seasons. In these crevices the *Nepenthes* grew in profusion, anchoring



Habitat of *U. uliginosa* ? & *D. neocaledonica* at 300 m. altitude, 14 km from Maral Kiki on the Noumea to Yate Road.



***D. neocaledonica* from Maral Kiki at 100 m. altitude.**

themselves in the dry red soil on the bottom or driving their taproots into the vertical walls in soil so hard that it was difficult to remove plants with an entrenching tool. *Nepenthes* grew everywhere both small and large. Their seeds had obviously found here what was lacking in all the other sites we had visited. Curiously enough the plants on this side of the road were generally like the ones we saw on Mt. Dore. They seemed to grow most profusely, in a band on the exposed northerly faces of the large eroded gullies, around the base of the hills. Some pitchers were heavily splashed with red most however were all green, the lower pitchers varied from near white to purple. At the western end of the search area a small stream tumbled down a steep rocky hillside it was a cool and refreshing diversion. Mark followed the stream across the road, it turned into a large and very wet gully near the lake. The plants here had pitchers of the squat type but their colour was a spectacular scarlet. Curiously these plants had no taproot instead they had an extensive system of black fibrous roots. Some seeds were collected and more photos taken. As the sun sank low on the horizon we drove back to the hotel.

Thursday was spent cleaning, sorting and packing the plants. That afternoon we drove into town and arranged for their shipment as air cargo the next day. We returned our hire car and walked back to the hotel. Friday morning we were taken to the airport by bus, and after an hour's delay, we flew out of La Tontouta on an Air France 747 bound for Sydney. The only species of carnivorous plant recorded from New Caledonia that we did not see, was *U. canacorum*, we knew where to find it but simply did not have the time this trip. When the country is stable again we would like to return for a longer visit.



***D. neocaledonica* flower at 350 m. altitude, 9 km east of Mount Col de Mourange on the Noumea to Yate Road.**



***U. uliginosa* ? from roadside pond at 300 m. altitude, 14 km from Marai Kiki on the Noumea to Yate Road.**

If you are thinking of going there in future, our advice would be to do so in seed season. As the plants flower from September until November we feel that December or January would give the best results. Neither the *Nepenthes* nor *Droseras* like root disturbance but, field collected *D. Neo Caledonicas* have an extremely high mortality rate, so we would recommend that only seed of this species be collected.

Both myself and Mark would like to thank Dr. Ben Wallace and John Forlonge of the Royal Botanic Gardens Sydney and Dr. Moreau, Le Director, De Herbarium O.R.S.T.M., for all their kind advice and assistance, without them our trip would not have been possible.

FOOTNOTE

¹In the *Nepenthaceae* of the Netherlands Indies by B H Danser the author referred to plants collected on the Doormantop in West Irian at 3250m alt. and 3520m alt. by H J Lam.

On page 396 he states "The plants of the Doormantop (Lam 1637 & 1654) have strongly abbreviate stems and are obviously an alpine form only; they have nearly round lids like the plants of New Caledonia."

The characteristics that Danser felt constituted an alpine form of this species are common amongst *Nepenthes viellardii* growing in arid conditions from 100m alt. to 800m alt. in New Caledonia. Although the plants that H J Lam collected have their growth stunted a little more than many of the plants of this species on New Caledonia it is only a matter of degree. The *N. Viellardii* which grow in arid conditions on that island use the same growth habit to cope with low humidity and lack of water as do the plants from the Doormantop which grow in freezing temperatures at high elevation Pitcher shape is not related to growth habit it represents genetic variation within this species, Eg; pitchers similar to Lam 1637 & 1654 were observed on plants growing in both dry and arid and wet and humid conditions at a site near the lake at Marai Kiki 100m alt.

All plant collection on this trip, was made in accordance with Permit No. 3330-844.

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A RAINFOREST IN THE BASEMENT: NEPENTHES CULTIVATION UNDER LIGHTS

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The genus *Nepenthes* has good potential for popular cultivation if certain drawbacks can be overcome. In general, its cultural requirements are not all that difficult, although it is a long way from a houseplant. When one considers the lengths that orchid growers will go to provide the necessary cultural conditions for their gems, however, optimism is justified. *Nepenthes*' dramatic pitcher formations provide ample reward for the dedicated hobbyist. As a bonus, plants may throw a spray of hundreds of tiny golden flowers at irregular intervals. Yet *Nepenthes* are all but ignored by the general public. I have been growing the plants for seven years, and can still count other *Nepenthes* growers that I have met on the fingers of one hand. One must reluctantly conclude that social prominence should not be the grower's primary motive for cultivating this genus.

Several factors have contributed to *Nepenthes*' lack of popularity in culture. There is a perceived difficulty in their cultural requirements. Many plants are rather large. The state of the genus' taxonomy is deplorable, and there is little agreement among growers as to whether species and hybrids are correctly labeled. Moreover, the few publications available on the subject tend to assume that one has a large greenhouse available for his or her horticultural efforts. Thus, there is no survey of species and hybrids generally available in cultivation with a view towards identifying acceptable cultural conditions and plants that are amenable to culture indoors. This note will address both of these subjects in the hope of encouraging others to cultivate these charming and unusual plants.

Nepenthes are the largest carnivorous plants. That statement alone is enough to scare away many prospective growers. However, there are no known instances of *Nepenthes* eating children, or even small dogs. *Nepenthes* have no moving parts, unlike some of the more well-known carnivorous species. They must attract their prey by means of color and scent. The plants are native to tropical rain forest and savannah in Southeast Asia, ranging from Madagascar to Australia and Vietnam. There are approximately eighty species, with new ones being described periodically. Various species are considered either lowland or highland types. In addition, a number of natural and artificial hybrids are available.

For purposes of indoor cultivation, *Nepenthes* may be divided into warm, intermediate and cool growers, based upon their general minimum night temperature requirements. Cool growing highland species require a substantial temperature drop at night, to below 55 degrees. Intermediate growers will tolerate a minimum night temperature of 55-65 degrees, or warmer conditions, while warm growers require a minimum night temperature of at least 65. Cool growers, such as *N. edwardsiana* and *N. villosa*, are not generally available. The discussion below, then, will concentrate on factors necessary for successful cultivation of warm or intermediate growers.

THE RAINFOREST

Although some growers report success in a living room environment where plants are grown in a south-facing window, most homes lack sufficient humidity to permit pitcher formation. My house is like most homes. Thus, I required a growing chamber. The chamber needed to be inexpensive and easy to build. The first chamber which I constructed is four feet wide, four feet long and four feet tall, with a two-foot high growing area (figure 1). The frame is lightly constructed of one-by-two inch furniture grade pine, and covered with a rigid
(Continued next page)



Figure 1 Greenhouse No. 1 Temporary plastic curtain has been pulled back over lights for photograph.

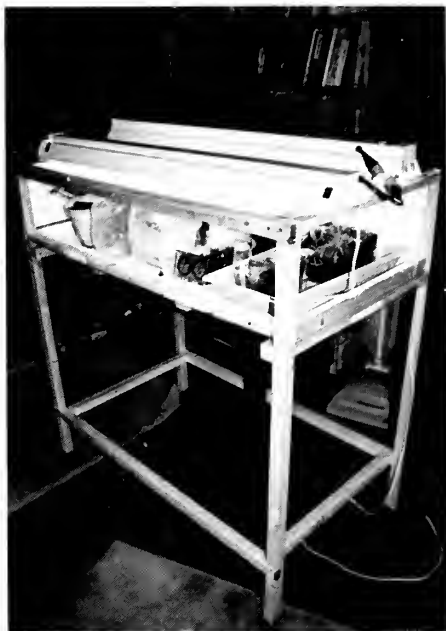


Figure 2 Greenhouse No. 2

plastic sheet on the front and glass on the top. Sides are covered with flexible vinyl sheet secured on the sides and bottom with velcro strips. Inside, the back wall and bottom are painted white with moisture resistant paint. Plastic trays on the bottom hold water for moisture. Plants rest on wood-framed wire platforms of various heights, permitting smaller plants to be as close to the lights as possible. The bottom half serves as a storage shelf.

Soon, that chamber proved insufficient to house the *Nepenthes* and *Phalenopsis* collection. A second chamber has temporarily alleviated the problem (figure 2). This structure, for smaller growing plants, is constructed of 2x3 frame members and encloses a two-foot wide, four-foot long, one-foot deep growing area. It is on wheels.

Cultural requirements for intermediate and warm-growing *Nepenthes* are not difficult. Most writings on the subject stress the need for high temperature, light and humidity. True, *Nepenthes* thrive in a warm, humid environment. However, many species and hybrids do not require extraordinary levels of any condition to grow and form pitchers. Thus, I suggest that the need for each of these three elements has been overstated. Of course, in order for plants to form truly large pitchers, greenhouse conditions, including high levels of these elements, are necessary. But the smaller size of plants and pitchers when grown under less than optimum conditions is not necessarily a drawback, since some types of *Nepenthes* will quickly outgrow a basement growing chamber under optimum conditions.

In short, the relevant inquiry when growing these monsters indoors is not how to provide optimum conditions, but, instead, how to provide the best balance of conditions for compact size with good pitcher form and coloration. In many instances size is the most desirable attribute to minimize. A discussion of the three vital elements—light, temperature and humidity—will illustrate that these plants are not as difficult to grow indoors as was previously imagined.

Light in the first chamber is provided by eight, forty watt fluorescent bulbs to illuminate an area of eight square feet. I use a mix of cool white, warm white and gro-lux (TM) type bulbs. Bulbs need to be changed on an average of once a year. Lights are on a timer which provides a fourteen-to-sixteen hour daylight period. Some supplemental light is provided through two small south facing basement windows.

Pring (1943) reported that a temperature of at least 70 degrees F. is required lest the pitchers turn brown and hard prior to developing. My experience, however, suggests that at least under indoor conditions a seasonal minimum night temperature of 55-60 degrees does not harm intermediate growers so long as the daytime temperature rises to 70. As previously noted, warm growers should have a minimum night temperature of 65 degrees and benefit from daytime temperatures of 75-80.

While average temperatures should not fall below the minimum set out above, established warm/intermediate growers may tolerate short periods of temperatures as low as 45-50 degrees without lasting harm. Two anecdotal experiences illustrate the limits of warm/intermediate *Nepenthes*' cold tolerance.

One cold February, our furnace went out. Typically, it was several days before the landlord could find the repairman. During that time, we subsisted on space heaters, and the temperature in the newly-unheated back room where the plants were located dipped to around 45 degrees for approximately three days. There were no harmful effects. Shortly thereafter, and to our great relief, we moved. The *Nepenthes* were moved to an insulated, but unheated basement. Temperature varied from 80 degrees in July to around 50 degrees during a cold January. the first winter, I initially did not use any supplemental heat source in the chamber, choosing to rely instead on the warmth provided by the fluorescent light ballast. At first, growth merely slowed considerably, which was not unexpected. However, after approximately six weeks below 60 degrees, plants suddenly lost vigor and leaves wilted while still green, even though the soil remained continuously moist. I immediately installed a soil heating cable, but it was too late for many, and nearly half of the collection was lost. The others took several weeks, or in some cases months, to regain their health. Not surprisingly, the lowland, warm-growing species such as *N. ampullaria* and *N. rafflesiana* proved the most susceptible to loss. Hybrids and intermediate growers were more resilient.

Several years later, the collection has recovered. Heating cables are used during the winter, along with a plastic curtain surrounding the growing area. In this manner, a daytime temperature of approximately 70 degrees is maintained in the winter, dropping to around 55 to 60 at night. Plants grow more slowly than in the summer, when day temperatures in the chamber are in the 80's, dropping to 65-70 at night.

Humidity is essential to good pitcher formation. As a general rule, *Nepenthes* cannot have too much humidity. Unlike orchids, they do not seem to require good air circulation. Indeed, some smaller plants thrive inside a closed ten-gallon aquarium inside the large chamber. I grow my warm growers in a closed aquarium upstairs. Cuttings and new arrivals are grown in a clear plastic bag until they stabilize. If a plant is not doing well, it will often improve if placed in a sealed plastic bag for a while. For plants in the chamber, I maintain 55-65 percent humidity by leaving standing water in the trays and misting regularly. Plants themselves should not stand in water for extended periods, but should be kept constantly moist.

A few miscellaneous notes will conclude the topic of cultural requirements. My plants grow in long-fibered sphagnum. It works so well that there is no need to try anything else. Note, however, that sphagnum should be handled with care to minimize the risk of sporotrichosis. I feed plants sparsely with osmocote pellets once or twice a year. Since *Nepenthes* are climbing vines, they will become leggy. When a lead reaches 1-2 feet, I cut it back to under six inches. This stimulates new basal shoots and the cuttings may be rooted.

ILLUSTRATIONS



Figure 3 *N. alata*, December, 1986, grown under lights since 1979. Measurements in background are in centimeters.



Figure 4 *N. reinwardtiana*, December, 1986, grown under lights since March, 1985. Approximately 10 cm.

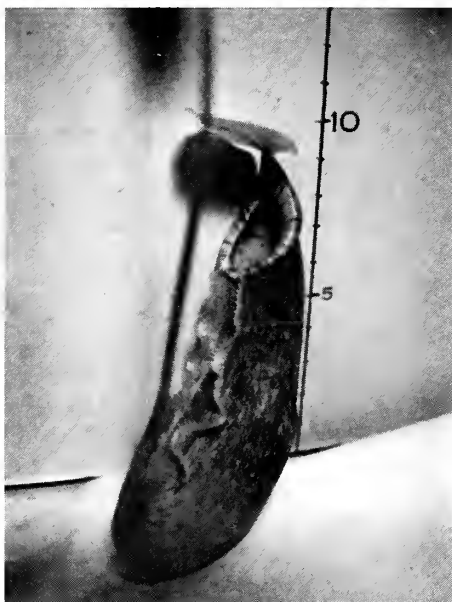


Figure 5 *N. sanguinea* (? possibly *x wrigleyana*), December, 1986, grown under lights since June, 1986. Approximately 10 cm.



Figure 6 *N. infundibuliformis* (unopened pitcher) December, 1986, grown under lights since July, 1985. Pitcher length approximately 12 cm.

ADAPTABILITY OF SPECIES AND HYBRIDS TO INDOOR CONDITIONS

Warm growers have difficulty thriving under the conditions described above. Generally, they grow for a while, but gradually lose vigor and eventually succumb to rot. Often, lower leaves will become yellow as a first sign of this syndrome. Warm growers include *ampullaria*, *echinostoma*, *gracilis*, *bicalcarata*, *gracillima*, *rafflesiana*, and *tentaculata*. Hybrids of these, such as *x hookeriana* and *trichocarpa*, should be carefully monitored. I am not presently growing any of these except *trichocarpa* and *bicalcarata*, which thrive in a closed aquarium in a sunny upstairs room.

Intermediate growers are stars of indoor culture. They tend to tolerate significantly cooler temperatures than the warm growers. Figures 3-6 illustrate some pitchers that have grown under lights from intermediate growers which thrive and freely pitcher under indoor conditions. Fortunately, this is a large group. Undoubtedly the best plants for these conditions are the *alata* complex. The standard green form, the red form, and the larger '*boschiana*' variant all do very well under indoor culture. *Boschiana* has formed pitchers up to five inches long. Yet these plants maintain a compact growth habit. If they get too leggy, they can be cut back and will often send out new basal shoots. The cuttings will root readily.

The following species may also be viewed as intermediate growers: *reinwardtiana*, *albo-marginata* (green), *tobiaca*, *ventricosa*, *infundibuliformis*, *macfarlanei* and *kampotiana* (probably mislabeled). The latter plant has been marketed under a number of names, including *mirabilis* or *thorelli*. I express no opinion on its true name. It is a vigorous grower. Perhaps the clone should be given a generic name, such as "Joe." All of these plants share the desirable trait of compact growth.

Many hybrids are intermediate growers, but the plants tend to be less compact. Some of these plants have similar parentage, according to the comprehensive genealogy set forth by Slack (1983). Intermediate growing hybrids include *coccinea*, *wrigleyana*, *dominii* (? identification), and *williamsi* (and most likely, *chelsonii*, although I have not cultivated it). A plant labeled as the species *sanguinea* shares these attributes, although it looks a lot like *x wrigleyana*. These plants also can be cut back when too large. They will grow from lower buds and basal shoots.

Some intermediate growers will grow well but only rarely form pitchers in the chamber. I conclude that this group needs higher light levels or humidity to form satisfactory pitchers. These include *N. superba* and *balfouriana* (possibly mislabeled). *Boissiensae* (*rubra* and *mastersiana*) also fall into this group but they will form pitchers from new growths.

Several other plants may be identified as intermediate growers on a tentative basis. They have done well, but are too new or have been lost due to moving stress. *Albo-marginata* (red), *fusca*, and *glabratus* were apparently victims of stress due to household moves, but have thrived for a time. *Khasiana* never survives more than one or two years for me. I have heard rumor of a need for a drier semi-dormancy for this species. *Petiolaris*, *khasiana x ventricosa*, and *stenophylla* are doing well but it is too soon to tell. All of these plants, however, have tolerated intermediate conditions for at least a time.

The above notes are indicative of my own experience. Others may have better or worse luck. Seemingly minor variations in temperature and humidity can have a dramatic effect on these unusual plants. However, their unique form makes them well worth growing. They may be obtained from sources listed in CPN.

AUTHORITIES CITED

Pring, *Nepenthes*, XXXI Mo. Botan. Garden Bull. 169 (November, 1943).

Slack, *Carnivorous Plants* (1983)

Literature Review

Balatova-Tulackova E. and E. Garcia. Phylantho selbyi-Aristidetum brittonorum mitracarpetosum depauperati, a new savanna community in Isla de la Juventud (Cuba). Folia Geobot. Phytotax. 22:217-222. 1987./English, Prague./

Description of savanna communities on Isla de la Juventud (former Isla de Pinos), including statements of *Pinguicula filifolia* and *Utricularia pusilla* stands. The substratum consists of oligotrophic sandy soil formed on siliceous deposits, rich in organic matter in the uppermost part of the soil profile (observed in the layer 0-7cm) and inundated during the humid period of the year.

Related plant communities (including the mentioned CP-species) have been described also in previous paper: Balatova-Tulackova E. and R. Capote: Contribution to the knowledge of some savanna and forb-rich communities on the Isla de la Juventud (Cuba). Folia Geobot. Phytotax. 20:17-39. 1985.

Centre for Life Studies (no author), 1985. Carnivorous plants. Centre for Life Studies (Zoological Gardens, Regent's Park, London NW1 4RY), 57p. (/1.00 UK, \$2.50 US ppd surface elsewhere).

For some reason we had not run across this little booklet before, and we are glad we did. Considering the limitation of size and its intent as a school educational tool, it has a lot of well-written and accurate information in it, if one is ready to excuse a very few oversimplifications. The booklet is very well illustrated by excellent line drawings and covers CP worldwide in terms of all genera, trap functions, etc. A good part of the book is given over to excellent methods of propagation and a thorough discussion of horticulture and cultivation with an eye to economy. The book concludes with a long list of sources, not only legally for plants in the UK, but also supplies and other educational materials including slides, books and VCR tapes.

Corker, B. Germination and viability of seeds of the pitcher plant, *Nepenthes mirabilis*. Malay Nt. J. 39(4): 259-264. 1986.

Seeds of the above CP species were collected and stored for varying lengths of time before sowing, to determine the duration of viability of the seed. Maximum viability (84%) was obtained when seeds were stored for two months and required light for germination. The longer stored seed required longer times for germination with 4 months storage needing 4 months to germinate.

Fromm-Trinta, E. Lentibulariaceae of Brazil: Aquatic *Utricularia*: 1 Bradea 4(29): 188-210. 1985.

Brazil has around 50 species of *Utricularia* generally separated into two groups by the presence or not of floating organs represented by swollen stolons situated around the scape. In this report, the author describes the floating species without those organs.

Janssens, J. In vitro propagation of sundews, *Drosera regia* Stephens. Meded Fac. Landbouwwet Rijksuniv Gent 51(1): 61-66 1986.

The author cultured 1cm leaf fragments by tissue culture on mineral salts, vitamins and supplemented with sucrose, agar and the hormones BA and IAA. After six weeks, the cultures are transferred to a medium with less mineral salts and vitamins, myo-inositol, sucrose, agar and activated charcoal to induce shoot elongation. The shoots of sufficient size are then transplanted to peat. One piece of leaf 1x2cm can produce about 50 plantlets in 5 months.

Meng, L.K. and C.K. Lok. The biology of *Dasyhelea ampullariae* in monkey cups at Kent Ridge. J. Singapore Natl. Acad. Sci. 14(0): 6-14 1985.

This fly has a very long life cycle of about 28 days under tropical temperatures and humidity in which the larvae develop inside in the liquid of *Nepenthes* pitchers.

The proteinaceous diet required by the females for producing eggs is obtained during the prolonged feeding larval stage. The plant serves as the only known source of its diet.

Slavick, A.D. and R.A. Janke. 1987. The vascular flora of Isle Royale National Park. *The Michigan Botanist* 26:91-134.

This floristic study occupies the entire May, 1987 issue. For those not familiar with the subject, Isle Royale is located some miles offshore from Michigan in Lake Superior. The island is reached only by ferry and there are no vehicles. Several good trails traverse the expanse of the island which is well wooded, has some ridges, and large numbers of shallow lakes and bogs. There are accommodations and supply outlets at the ferry landing for those who may wish to visit the island and observe; the entire island is a National Park. Among the 700 species listed, the following CP are present: *Sarracenia purpurea*, *Drosera anglica*, *D. intermedia*, *D. linearis*, *D. rotundifolia*, *Pinguicula vulgaris*, *Utricularia cornuta*, *U. gibba*, *U. intermedia*, *U. minor* and *U. vulgaris*. The relative common or uncommon numbers, and habitats are mentioned with each species.

Tans, William. 1987. Lentibulariaceae: The bladderwort family in Wisconsin. *The Michigan Botanist* 26:52-62.

This is an excellent review article of the presence of family members in Wisconsin. The article includes a brief review of *Utricularia* description and function, range maps (county dot) of species locations in the State, and finally two excellent keys: One for flowering and one for sterile material, followed by detailed plant descriptions and habitat information. Species include *Utricularia resupinata*, *U. purpurea*, *U. intermedia*, *U. minor*, *U. gibba*, *U. Cornuta*, *U. Vulgaris* and *U. geminiscapa*. To make the family coverage complete, *Pinguicula vulgaris* is also covered. *P. vulgaris* and many of the *Utricularias* are rather infrequent.

Thum, M. Segregation or habitat and prey in two sympatric carnivorous species, *Drosera Rotundifolia* and *Drosera intermedia*. *Oecologia (Berl)* 70(4): 601-605 1986.

In a bog in southern Germany, both species have nearly the same biomass but differ in individual size and abundance. *D. rotundifolia* grows in the higher parts of the bog and traps mostly wingless springtails. Winged insects were found mostly on *D. intermedia* which the author attributes to different microhabitats and different shape of the plants.

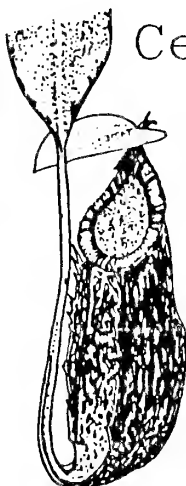
Truswell, E.M. and N.G. Marchant. Early Tertiary pollen of probable Droseracean affinity from central Australia. *Spec. Pap. Palaeontol* 0(35): 161-176. 1986.

A new species found in the Hale River Basin, northeast of Alice Springs, central Australia is called *Fischeripollis halensis*. The pollen was found to be probably from the Middle to Late Eocene age, a time when there was abundant rainforest and high uniformly distributed rainfall. There is a strong resemblance of this pollen to the morphology of pollen of extant *Dionaea*, the Venus Fly Trap. *F. halensis* differs in detail from the pollen of *D. muscipula*. This record is the oldest occurrence of this pollen morphotype.

Wagner, G.M. and K.E. Mshigeni. The *Utricularia-Cyanophyta* association and its nitrogen-fixing capacity. *Hydrobiologia* 14(3): 255-262 1986.

Nitrogen-fixing blue-green algae were found inside the bladders of *U. inflexa* growing in a shallow lake in Tanzania. The most abundant genus was *Anabaena* which occurred on the outer surfaces and inside mature traps fixing nitrogen. The blue-green algae was not found in the lake water. It was proposed that this association involved a degree of physiological interdependence and may have potential as a biofertilizer for rice.

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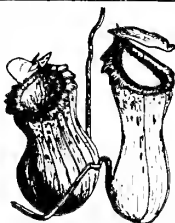
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Byblis liniflora (5), *Capsella bursa-pastoris* (15), *Darlingtonia californica*, *Dionaea muscipula* (8), *Drosera aliciae* *D. anglica* (8), *D. auriculata* (5), *D. binata* (1), *D. brevifolia* (1), *D. burkeana* (6), *D. burnannii* *D. capensis* *D. capensis* <narrow leaf>, *D. capensis* <mix>, *D. capillaris* (6), *D. dielsiana* (7), *D. erythrorhiza*, *D. filiformis* *filiformis*, *D. gigantea* (8), *D. glanduligera*, *D. intermedia*, *D. intermedia* <maxima>, *D. intermedia* <Carolina giant>, *D. macrantha*, *D. menziesii*, *D. montana* (1), *D. montana* <white fls> (3), *D. neesii* ssp. *neesii* (4), *D. platystigma* (1), *D. pulchella* (3), *D. ramellosa* (1), *D. rotundifolia*, *D. spatulata* (9), *D. spath.* <Australia> (1), *D. spath.* <rotundate> (2), *D. spath.* <Formosa> (2), *D. spath.* <Kanto white fls> (2), *D. spath.* <lovelae> (3), *D. spath.* <Kansai> (3), *D. stolonifera* *rupicola* (6), *D. stolonifera* *stolonifera*, *D. trinervia* (3), *D. villosa* (4), *D. sp.* "Wattiup" (1), *Drosophyllum lusitanicum* (5), *Nepenthes bongso* (1), *N. khasiana* (10), *N. mirabilis* <Borneo> (5), *N. reinwardtiana* (15), *Pinguicula alpina* (8), *F. lusitanica* (9), *P. macroceras nortensis* (7), *P. vulgaris* (5), *Polypompholyx multifida*, *Sarracenia alata*, *S. flava* "atropurpurea" (10), *S. flava* <Copperlid> (6), *S. flava* <green> (3), *S. leucophylla*, *S. minor* (15), *S. purpurea*, *S. purpurea purpurea* (8), *S. purpurea venosa* "Chipoca" (10), *S. purpurea venosa* "Louis Burk" (8), *S. rubra gulfensis* (4), *S. rubra jonesii* (2), *S. rubra wherryi* (15), *Sarr.* hybrids - see last list, *Utricularia aurea* (5), *U. capensis* (2), *U. lateriflora*, *U. longifolia* (7), *U. pentydactyla* (4), *U. racemosa* (3), *U. subulata*, *U. Violacea*.

WANT ADS

THOMAS C. GIBSON (Department of Botany, 132 Birge Hall, 430 Lincoln Drive, Madison, Wisconsin 53706) has large vigorous, and robust plants of *N. rajah*, *N. clipeata*, *H. neblinae*, *N. x cf Kinabaluensis*, *N. hamatus* and I want similar plants of *N. inermis*, *N. ephippiata*, *N. pilosa*, *N. campanulata*, different clones of *N. clipeata*, and *H. ionasiae*. I don't want to trade for anything else or sell my plants.

JERRY A. PHELPS (6013 Innes Trace Rd., Louisville, KY 40222.) (WB) *Heliophora tatei*, *Heliophora ionasi*.

QUINTON TUGGLE (1087 Bremen Mt. Zion, Waco GA 30182).

WTB: *S. flava* (maxima), *S. flava ornata*, *S. flava* (copper top), *S. rubra alabamensis*, *S. alata* (red cid), & *S. alata pubescent*.

T: *S. flava* (heavy veined), *S. flava* (red form) (cut throat), *S. rubra x S. purpurea*, & *S. leucophylla* (green and white) (no red pigment).

ANDREAS WISHUBA (Mudauer Ring 227; D-6800 Mannheim 52; West Germany).

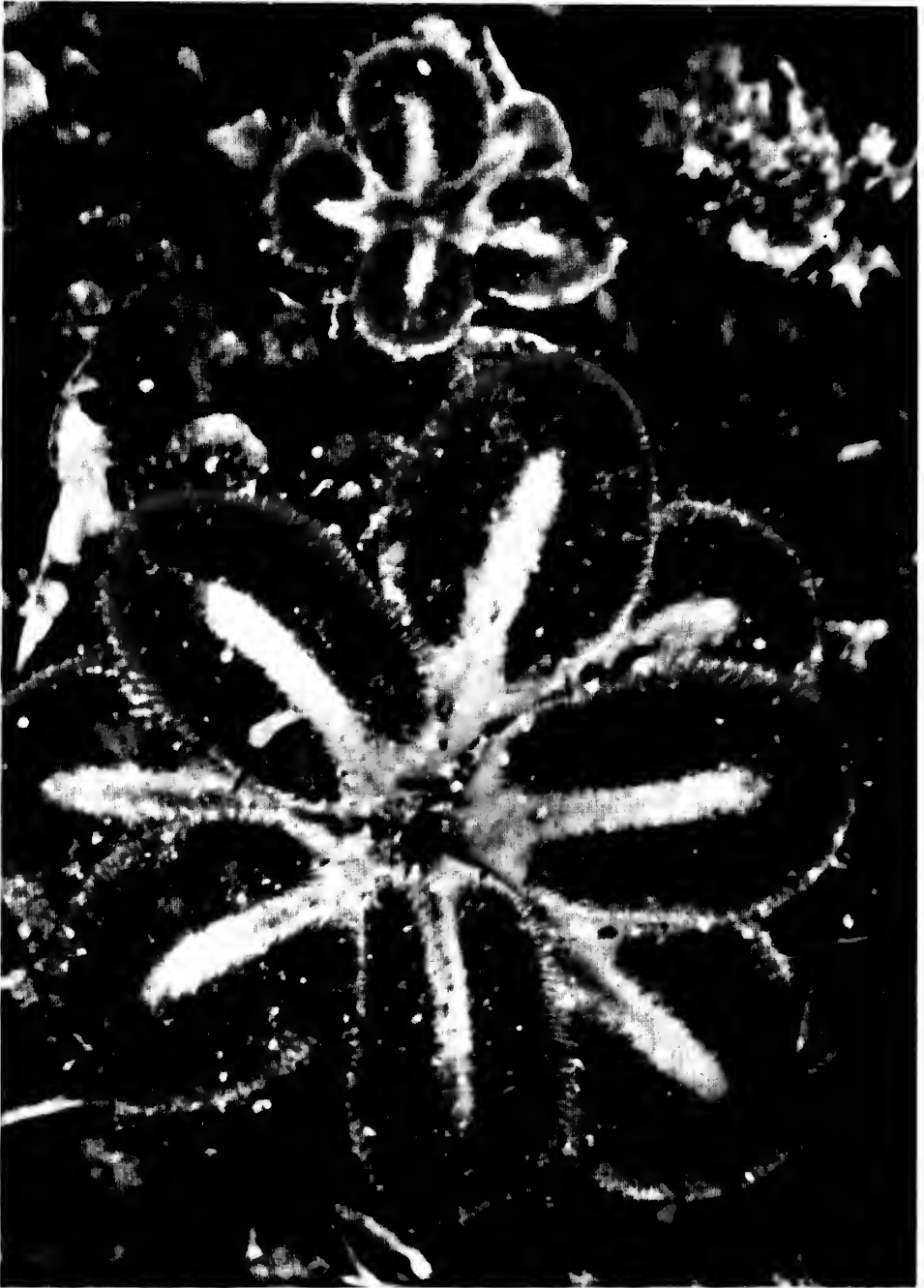
I have for trade:

Darlingtonia californica, *Drosera aliciae* (different varieties), *capensis* (Red Leaf and other arieties), *cistiflora* (White and Pink Flower), *hilaris*, *indica* (Africa, White Flower), *intermedia* *Roraima*, *madagascariensis* *schizandra*, *trinervia* (different varieties), *Utricularia reniformis* (large type), *nephrophylla*, *delicatula*, *capensis* (different varieties), *livida* (different varieties), *livida* (different varieties), spec. 'Kelam', *Polypompholyx*, *Pinguicula hirtiflora* (true species), *longifolia* (different varieties), *grandiflora* (different varieties), *vallisneriifolia*, various Mexican Ping's, various *Nepenthes* species, *Heliophora minor* + *heterodoxa* (only for material of comparable rarity) various *Sarracenia* species + hybrids, and many other CP.

I want to trade or buy:

Rare CP from South Africa, South America and Australia, *Byblis gigantea* seeds, *tuberosa* *Drosera*, *Pygmy Drosera*, North American *Utric's* and *Ping's*, *Sarracenia rubra jonesii* Yellow, *Utricularia hookeri*, *racemosa*, *scandens*, *violacea*, *volubilis*, *yakusimensis*, and other uncommon *Utricularia*.

I want contact to CP enthusiasts from all over the world.



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Back cover: One of the different color forms of *Drosera erythrorhiza*-red edge form.
Photo in habitat (South West Australia) by Phil Mann.

N. S. K.

BOTANICAL GARDEN